Tailoring of company internal project management standards for power plant projects

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Keywords: project management standards, tailoring, project categorization, power plant projects

Abstract: This paper presents the results of a master thesis research about the advancement of project management systems carried out at the chair of Professor Dr. Konrad Spang, Institute for Project Management of the University of Kassel. In cooperation with a German energy supplier possibilities for tailoring measurements of project management standards were investigated to suit them to different types of power plant projects.

1. Introduction

The energy sector is faced with a considerable technological development. Driven by a worldwide rising need for energy, dwindling resources and the constraints of climate change remarkable changes are taken place especially in the field of renewable energies. For instance in Germany the share of renewables on the gross electricity generation has been doubled from 10% to 20% in the years between 2005 and 2012 and this trend is going to continue [1, 2]. This kind of technological development sets new and different requirements according to project management and therewith to the scope and the applicability of project management standards. Accordingly companies in the energy sector have to adapt their approaches according to these changes to stay up to date and capable of competing. That implies amongst others to transfer best practice processes between different types of power plant projects, e.g. from "classic" power plant projects (fossil power technology) to new kinds of power plant projects (mostly renewable technologies). Therefore companies have to advance their company internal project management standards.

Company internal project management standards deal with the conflict between the company's goal of standardization on the one hand and the unique character of projects on the other hand. That means companies try to set up clear and common structures to raise their project management quality by implementing common project management standards. At the same time they risk to cause new inefficiencies by over restricting their projects flexibility with regulation. This contradiction between uniformity and flexibility needs to be balanced [3]. To ensure the required balance between the necessary flexibility for projects and the goal of standardization a specific adaption of the company internal project management standards for different types of projects and according to the specific project properties is needed.

2. State of research

Amongst others Crawford et al. [4] and Shenhar & Dvir [5] investigated types of projects. Their results show how projects differ and which kind of project categories exist. But nevertheless not much literature is available that gives direct support to companies and their project managers about how to adapt standards, processes, tools etc. to the different types of projects. This gap is shown by Bredillet et al. [6, 7]. In their work about the „Nine Schools of Project Management Research", the authors analyze the current state of project management research. They write that "research in this area can productively continue into the extensions of categorization systems of projects and the effectiveness and refinements of processes used to manage various categories of projects in different environments." [7, p. 3] Further more they identify potentials for current research in clarifying "the project management approaches most suitable for different project settings and methods for adapting the organization's existing approaches to various types of projects" [7, p. 3]. Hence the research underlying this paper concentrated on the connection of project management categorization systems with project management processes to improve the companies understanding of using optimal approaches for the given type of projects.

3. The tailoring concept

The method shown is named as technology orientated tailoring of company internal project management standards. Within the scope of this paper company internal project management standards are defined as guidelines, organizational structures, processes and methods for companies to plan, control and monitor their projects. These standards therewith are the basis for the project management system of a company [9]. The following concept is based on a given generic, process orientated project management systems that can be tailored and enhanced for different types of projects. This constraint implies that the tailoring of project management standards is realized by modifying the project processes. According to DIN 69901-2 [10] project processes are differed into two groups: a) Project management processes that contains the activities to manage a project. b) Project core processes that contain all value adding and technical activities.

The tailoring procedure shall be able to transfer given best practice processes, approaches or methods between projects and to adapt them to the given project type. To achieve these requirements a three step research approach has been chosen:

a) A new project categorization system for power plant project has been developed.
b) The correlation between project categories and project management processes has been investigated.
c) Tailoring measures based on the correlation have been shown.

Project categorization for power plant projects

Project categorization attends to identify types of projects due to their properties [4]. Accordingly projects properties have to be defined that can be used to differ projects. The analysis of present project categorization systems showed that there are two different kinds of categories:

Absolute properties: Those kinds of properties can be differed in an objective way by defined clear property variants. They describe somehow the scope of the project. The variants of absolute properties directly depend on the company's context and must be defined and modified of every company itself.

Absolute Property	**Examples of variants**
Power plant type	Cole fired power plant, gas fired power plant, onshore or offshore wind park
Project type	New build, reconstruction, extension, modification, service
Project location	Continental, nation, regional
Project ownership / funding	Internal project, external project, funding by costumer, funding by supplier
Customer / supplier relationship	Turnkey awarding, lot wise awarding

Relative properties: Those kinds of properties must be differed by comparison to other projects. They can only be measures in a subjective way and cannot be expressed in absolute values. As shown by Sapper [8] the difference of projects in those properties can be expressed by a quantitative weighing procedure. That means that the property is evaluated for a certain project on a defined scale of numbers (e.g. from 1 to 5). Defined indicators for each stage of the scale can help to make the results of a weighing more objective. Relative properties are normally more general then absolute ones. Hence their indicators do not depend that much on the company or the product as show for the absolute properties.

Relative Property	Examples of indicators
Urgency	Time frame, critical to time, impact of delays
Technical complexity	Number of work packages, complexity of task or product
Coordinative complexity	Number of involved organizations/ departments, organizational conditions
Grade of innovation and novelty	Share of innovative technology, experiences with used technology
Scope	Budget, resources, share of budget on turnover
Risk	Number of risks, probably of risks, impact of risks
Number of involved people	Team members, externals, organization
Strategic importance for company	Share of budget on turnover, stakeholders

The correlation between project categories and project management processes

The research has shown a correlation between project core processes and absolute properties on the one hand as well as between project management processes and relative properties on the other hand.

- Project core processes and absolute properties both depend directly on the company's context. As shown above absolute properties given an overview of the project scope while core processes describe how to achieve this scope [5].
- Project management processes and relative properties both relate to the management of a project. While management processes contain the management activities for the project [5], the characteristics of a project's relative properties directly influence these management activities [10].

Sapper [8] has shown that influence matrices can be used to identify independencies between two properties. This method is adapted but modified to check the influence of the project properties to the project processes as explained above. They imply the question how much the project processes $y \in \{1,2,\ldots,j\}$ change depending on a change of property $x \in \{1,2,\ldots,i\}$ [8]. The bigger the expected change, the higher is the influence of the property to the process. The evaluation can be done by using a scale between 0 (no influence of the property to the process) and 3 (very strong influence of the property to the process).

For a high level of standardization within a company it should be aspired to have one universal correlation matrix which is applicable for all projects within a given process landscape. In how far that's possible for a company has to be defined in every single case. It is recommended to execute an expert workshop with the company's project managers and experienced project members to achieve most reliable results.

	PM-Process 1	PM-Process 2	….	PM-Process j
relative P-Property 1	z_{11}	z_{12}	…	z_{1j}
relative P-Property 2	z_{21}	…	…	…
….	…	…	…	…
relative P-Property i	z_{i1}	…	…	z_{ij}

	Core process 1	Core process 2	….	Core process j
absolute P-Property 1	z_{11}	z_{12}	…	z_{1j}
absolute P-Property 2	z_{21}	…	…	…
….	…	…	…	…
absolute P-Property i	z_{i1}	…	…	z_{ij}

Tailoring measures

Based on the results from the correlation matrix tailoring measures can be defined for project management processes and project core processes. The tailoring of project management processes can be executed in a mathematical way. Therefore the results of the correlation matrix have to be normalized to one column by column. This is done by dividing every value by the column sum. The results show the properties' share of influence on a process. With these normalized values a process weight for each single management process can be calculated. The normalized values $z_{xy} \epsilon [0,1]$ of the properties $x \epsilon \{1,2,...,i\}$ are multiplied with the properties results of the project categorization and then summed up for one process. The result is a process weight (PW):

PW_y (PM-Process y) = [Urgency]*z_{1y} + [Technical complexity]*z_{2y} + [Coordinative complexity]*z_{3y} + [Grade of innovation and novelty]* z_{4y} + [Scope]*z_{5y} + [Risk]*z_{6y} + [Number of involved people]*z_{7y} + [Strategic importance for company]*z_{8y}

Project managers can use the PW to see which processes in their project are very important or critical so that they can pay more attention to them. Further the method allows to differ between A-, B-, C- and D-class processes. There with the classical classification of projects into A, B, C, D can be realized more detailed. For every project management process four process variants can be defined, one for every class. This enables companies and their project managers to better understand a project in the early phase so that better planning, controlling and monitoring can be achieved.

For the tailoring of core process a mathematical approach is not available. But the results of the correlations matrix helps to set up the optimal process model and to transfer processes from similar projects. The line total shows the most influencing properties. They can be defined as primary properties. On the basis of the primary properties reference process models can be defined. Those reference models can be administrated in a project process data base. The secondary properties can help to modify the reference models to suit them to the affected project. To realize such a tailoring system intensive post project evaluation and documentation is needed. Therefore post project assessments and audits should be implemented.

4. Results and Conclusion

The described research has shown an approach for companies in the energy sector to better analyze their projects. The focus of the investigation was on the correlation between project properties and project management processes. Therefore a project categorization system has been developed that differs between relative and absolute project properties. That gives a better understanding of the projects characteristics. Further a correlation between project management processes and relative properties and between project core processes and absolute properties have been shown. To determine the influence of the properties to the project processes a correlations matrix has been developed. This analyzes is the basis for the tailoring of the project processes and therewith of the project management standards to fit them to the projects requirements.

The tailoring method can further be used to gather new information for the implementation of program or portfolio management. It enables to transfer knowledge as best practice processes methods and tools between projects. Therewith a continuous improvement of the project, program and portfolio management within the company can be achieved.

5. References

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